paper mulberry (*Broussonetia papyrifera*, Vent), also fibrous plants, including the Rhea, or China grass (*Boehmeria nivea*, W. and A.). Much progress has been made in arranging the specimens in the new building which has been providedf or the herbarium, and numerous contributions have been received both to the herbarium and to the gardens. In the Report on the cinchona plantations Dr. King gives details of the year's crop, of the expenditure for the year, and of the progress of the several forms or varieties. At the factory the total out-turns for the year was 8714 lbs. of febrifuge, 250 lbs. of which were of the new crystalline preparation, which closely resembles the ordinary febrifuge, but, on examination, the grains are seen to be small crystals; it differs, however, in constitution from the old febrifuge, inasmuch as it contains none of the amorphous alkaloid which is the ingredient in that preparation which causes the nausea which sometimes follows its administration. The efficiency of the staff both in the Calcutta Gardens and at the cinchona plantations is indicated by the testimony which Dr. King, with his usual frankness and consideration, bears to the ability of his subordinates.

From the Botanic Garden, Hong Kong, Mr. Charles Ford, the Superintendent of the Botanical and Afforestation Department, reports, under date April 30, 1884, of the department under his charge. A good many plants both of commercial and horticultural interest have been grown with more or less success, including the carob tree (*Ceratonia Siliqua*) of Southern Europe, the Chinese tea oil tree (*Camellia drupifera*), the Chinese varnish tree (*Aleurites vernicia*), and many others. A very interesting account of a visit to the Lo-fau-shan Mountains and a list of the plants collected is given in this Report.

## NOTES

HER MAJESTY'S GOVERNMENT, on the recommendation of the Lords of the Committee of Council on Education, have given their adhesion to the International Geodetic Association, and have nominated the undermentioned gentlemen as delegates of the United Kingdom to the Association, viz.:—The Director-General of the Ordnance Survey (for the time being), Col. A. R. Clarke, R.E., F.R.S., the Astronomer-Royal, the Hydrographer of the Navy (for the time being), General J. T. Walker, R.E., C.B., F.R.S.

TWO academic honours have recently, *Science* states, been conferred in the United States upon scientific men, which are worthy of note because more rare and costly than such distinctions usually are. At New Haven, on the day before commencement, a bronze statue of Prof. Silliman, for more than fifty years a teacher of chemistry, mineralogy, and geology in Yale College, and the founder of the *American Journal of Science and Arts*, was placed on its pedestal near the new chapel. The other honour is that of a medal struck at the U.S. Mint in Philadelphia, at the request of the colleagues and friends of Prof. Sylvester, to commemorate his residence in Baltimore during a period of seven years, marked, among other things, by the establishment of the *American Journal of Mathematics*. The medal, in size and general aspect, is not unlike that which was struck in commemoration of the life of Agassiz. On one side is an accurate and spirited portrait of the mathematician, with the name Sylvester; on the reverse a Latin inscription commemorates the fact that he was for seven years Professor of Mathematics in the Johns Hopkins University—from 1876 to 1883. The original medal in gold was sent to Prof. Sylvester, in his new home in the University of Oxford; a duplicate in silver was retained in Baltimore, and a few impressions in bronze have been distributed among his scientific friends and correspondents.

*Science*, in referring to the recent researches of Koch, states that work of value upon the subject of micro-organisms is not done in this country (the United States), nor will it be until some such encouragement is offered to investigators as is the case in France and Germany. This kind of research requires the rare combination of many forms of training, added to a critical, analytical, and judicial mind. These we can have; but until the facilities for the work are offered, until the necessity for personal sacrifice and self-denial is done away with, we can hope for no better work in the future than has been done in the past; in other words, what is first needed in order to place our own investigations upon an equality with those of the two countries mentioned above, is a thoroughly-equipped, fully-endowed laboratory, with a strong corps of well-trained and salaried officials. These remarks might very well have been written concerning our own country, and the official mission of Dr. Klein to India is a tardy recognition by our Government of the necessity of State intervention if scientific research is to be pursued with any hope of speedy and substantial practical results. The true way to encourage such inquiries (*Science* truly says) lies in the establishment of a Commission composed of men thoroughly trained and qualified for the work, and then to treat it as the German Government has treated its Cholera Commission, that is, to give it full powers and funds to allow the prosecution of its labours to the end.

THE death is announced at the age of seventy-five years of Sir Erasmus Wilson, the eminent surgeon.

THE death is also announced of Mr. John Aitken, J.P., of Urmston, well known as a geologist in the northern counties. Deceased was born in 1820. He was early distinguished for his application to scientific matters, and he twice filled the office of President of the Manchester Geological Society. He wrote for the Society's papers a number of articles relating chiefly to the geology of Clitheroe, Bacup, and Holcombe, and he also contributed to the *Geological Magazine* and the *American Journal of Science*. He furnished for Newbiggin's "History of the Forest of Rossendale" the geological section relating to that district.

SIR JOHN LUBBOCK has been compelled, for personal reasons, to abandon his intention of attending the meeting of the British Association at Montreal.

A COMMITTEE was appointed in 1882 at the Montreal meeting of the American Association for the Advancement of Science, "to confer with committees of foreign associations for the advancement of science with reference to an international convention of scientific associations." The committee consists of Dr. T. Sterry Hunt, Mr. Alexander Agassiz, and Prof. Simon Newcomb. If the British Association responds, as has been suggested, by also appointing a committee, the official channels for the interchange of opinion between the two national bodies will be suitably established on both sides. We (*Science*) are unable to make any authorised statement as to what the American committee has done or proposes, but its membership justifies the conviction that it is capable of efficient action, wisely planned. We shall await their report with interest.

THE Committee appointed by the Government at M. Pasteur's request to verify his experiments in the treatment of hydrophobia has just presented its first report. M. Bouley is president, his colleagues being MM. Beclard, Paul Bert, Tisserand, Villemin, and Vulpian. The Committee states that M. Pasteur's experiments have been entirely borne out. Inoculation with the attenuated virus of hydrophobia gives a dog immunity from the disease, just as similar treatment preserves a sheep from *charbon*. All the twenty-three dogs submitted by M. Pasteur as having been thus inoculated have resisted the strongest virus on inoculation, whereas the majority of the nineteen non-inoculated dogs have suc-

cumbed. Of the latter, six were bitten by mad dogs, three of them becoming mad, eight were subjected to intra-venous inoculation, all becoming mad, and five to inoculation by trepanning, all becoming mad. The result is decisive; but the Committee will now inoculate a large number of fresh dogs, and will compare these with an equal number of dogs not inoculated. It will likewise investigate the question whether after a dog has been bitten inoculation with the attenuated virus will prevent any consequences from the bite. M. Pasteur will lay before the International Health Congress at Copenhagen results which, as the Committee remarks, "are so honourable for French science, and give it a fresh claim on the gratitude of mankind."

A CORRESPONDENT living about two hundred yards from the river at West Chelsea complains that mosquitos first appeared sparingly in the middle of July, but are now almost nightly visitors. There is too much reason to fear, he states, that they are thoroughly acclimatised in this part.—Mosquitos and gnats are synonymous terms. Whenever the heat is greater than usual we constantly receive notices similar to the above. Possibly it renders the gnats more vicious, and at the same time the object of their attacks more irritable. Gnats (mosquitos) inhabit water (not sea-water) in their early stages, and from this reason it is practically impossible to import them, unless intentionally. The conditions at West Chelsea at the present moment are particularly favourable to the welfare of gnats (see article "Mosquito" in the new edition of the "Encyclopædia Britannica").

THE eighth International Medical Congress, of which the King of Denmark has consented to be the patron, was opened on Sunday in the Grand Hall of National Industry, Copenhagen, in the presence of the King and Queen of Denmark, the King and Queen of the Hellenes, the Crown Prince and Crown Princess of Denmark, and the rest of the Royal Family, the Danish Ministers, the Corps Diplomatique, the official authorities, civil and military, and delegates from Great Britain and Ireland, Germany, France, Russia, Austria, Holland, Belgium, Greece, Switzerland, Japan, New York, Columbia, Kentucky, and California. Addresses were delivered by the President, Prof. Panum, the Secretary, Dr. Lange, Sir James Paget, Prof. Virchow, and Prof. Pasteur. The assembly consisted of about 1500 members.

EARTHQUAKES have been frequent and widespread during the past few days. The inhabitants of the towns and villages along the whole range of the Alban hills were alarmed at two a.m. on August 7 by a sharp shock of earthquake, followed by another at a quarter past three. The direction taken by the wave was through Velletri, Nemi, Ariccia, Albano, Castel Gandolfo, and Rocca di Papa and Frascati. The shocks were most severely felt at Rocca di Papa, but no damage was done beyond the felling of two chimneys at Ariccia. At half-past three a severe shock, quickly followed by another, was distinctly felt at Rome, and that which shook the Alban hills extended also as far as Porto d'Anzio, on the coast.

AN earthquake shock shook the most solid buildings in New York at two o'clock on Sunday afternoon, and produced a sensation like that on board a steamer under way. At Brooklyn the residents were frightened into running out of their houses. The earthquake suddenly moved along the Alleghany Mountains and their eastern slopes, from Virginia to Vermont, in a direction from south-west towards north-east, extending over the entire country from the mountains to the ocean. The most southerly city in which the shocks were noticed was Washington, and the most northerly Brattleborough, Vermont. Two distinct shocks, each of about two seconds' duration, with an interval of about four seconds, were generally felt, while in New York and further eastwards a slight third shock was experienced a few minutes afterwards. The earthquake was observed at nine minutes past two o'clock in the afternoon at Philadelphia, and somewhat later to the eastward of this city. It was most severe in New York City, Connecticut, and Boston. The vibration was slighter elsewhere.

SLIGHT earthquake shocks, recurring at short intervals, have recently been felt at Massowah.

PROF. MILNE, of Tokio, Japan, writing to the *Times* on the subject of the Essex earthquake, concludes as follows:—"Before earth movements can be generally understood, it is necessary that they should be observed as other natural phenomena are observed. A reason that has been expressed against the establishment of seismometers in British observatories is that in Britain earthquakes are a rare occurrence. Such a reason appears to arise from an imperfect acquaintance with the phenomena to be observed. Earth-tremors, which are minute earthquakes, may be observed in Britain every day. Messrs. George and Horace Darwin have shown that such movements are of common occurrence in Cambridge. Then there are the slow earthquakes or earth-pulsations, like those which I have from time to time observed in Tokio. Whether these exist in Britain cannot be known until they are sought for. That they existed on the outer rim of the area where the Essex earthquake was felt is tolerably certain. It is also certain that shortly after great earthquakes—as, for instance, some which have shaken South America—pulse-like motions have been observed in the bubbles of astronomical levels at places as distant as St. Petersburg. When we consider that we are observing meteorological changes with which earth-tremors have a close relationship, that we observe the tides, magnetic and electric changes in our earth, and the escape of gas in our mines, with all of which earth-movements may be closely associated, when we possess so many earthquake-shaken colonies, and send our Navy and mercantile marine to all the earthquake countries of the world, it would certainly not be an unreasonable undertaking for us to investigate the ill-understood phenomena which continually occur beneath our feet. We study our oceans, our atmosphere, the sky above us, and, I may add, the ice at our poles, while the changes in the earth on which we live are almost neglected."

MESSRS. COTTEAU AND KORTHALS, members of the French Mission sent by the Minister of Public Instruction to explore the Krakatoa volcano, write from Batavia on June 2 that the object of the expedition has been fully realised. Soon after their arrival at Batavia on May 14, the Dutch Colonial Government placed at their disposal a small steamer, on board of which they started for the Sunda Strait on the 21st. Along the west coast a well-marked line, running at an elevation of from fifty to eighty feet above sea-level, indicated the limit reached by the terrible wave that spread disaster far and wide towards the end of August 1883. The plantations had been swept away, and all the houses of this populous district, together with the town of Anjer, had completely disappeared. On the 23rd the steamer cast anchor at the head of Lampong Bay on the south coast of Sumatra, whence a visit was paid to the Telok-Betong district. Here the extensive and thickly-settled coastlands had assumed the aspect of a desolate swamp, relieved here and there by a few bamboo huts recently set up. Nearly three miles inland lay the steamer *Berouw*, which had been borne on the crest of the wave into the forest, where it now forms a sort of bridge across a small stream. On the 25th the formerly fertile and densely-peopled islands of Sibuku and Sibesi were successively visited and found to be entirely covered by a deposit of dry mud several yards thick and furrowed by deep crevasses. Of the inhabitants, all had perished to a man. Continuing the trip on the 26th to Krakatoa itself, the mission was surprised to note the complete disappearanee of the three islands of Steers, Calmeyer, and the islet east of Verlaten, which had risen above the

surface at the time of the eruption, but which are now covered by 12 or 14 feet of water. Approached from the north Krakatoa seemed wrapped in a whitish smoke, vapours apparently issuing from fissures on this side, and settling on the summit, which is at present 2730 feet high. It was at this point that the great convulsion took place on August 26-27, when about half the island was blown into the air. A closer examination showed that what had been taken for fissures were simply ravines, and the vapours were clouds of dust stirred up by stones incessantly rolling down the steep slope of the mountain. This was accompanied by a continuous noise like the rattling of distant musketry, while stones of a certain size were seen whirling in the air, then falling and ricochetting down to the sea. Notwithstanding the evident danger, the boats of the expedition succeeded in approaching the foot of the volcano and collecting specimens of the rocks at several points. The same afternoon they reached the island of Verlaten, formerly one mass of verdure, now uniformly covered with a layer of solidified ashes about 100 feet thick. The deep crevasses, widened by the erosion of tropical rains, give the aspect of a glacier to this island, which has been doubled in extent by the deposits from the last eruption. Returning next day to Krakatoa the members of the expedition found a safe landing place, where it was possible to study the nature of the rocks and other matter ejected by the volcano. No trace was found of animal or vegetable life, with the exception of a solitary little spider, and the solidified bed of mud and ashes was estimated in some places to have attained a thickness of from 200 to 260 feet. A black rock rising a few yards above the surface about a mile and a quarter from the present shore, represents a last fragment of the portion of the island engulfed during the eruption. After touching at Lang Island, which presented much the same appearance as its neighbour Verlaten, the expedition concluded its survey of the Strait, landing on the 28th at Merak at the north-west extremity of Java. Merak had shared the fate of Anjer, and the coast-line in this district had been considerably modified. The expedition returned to Batavia on the 29th, after determining two new facts—the disappearance of the islands upheaving during the eruption, and the total cessation for the present of all volcanic activity at Krakatoa.

ON Saturday, August 9, M. Renard, Captain of Engineers, and M. Krebs, Captain of Infantry, made an experiment with the directing balloon which they are constructing at the expense of the French Government in the aëronautical works of Chalet Meudon. The balloon, which is about 60 metres in length and 10 metres in diameter, carries a long platform of about 40 metres in length and 3 metres in breadth. At one of its extremities sit the aëronauts in a car. The aërial helix and a gramme magneto-electric machine are placed at the other. The voltaic elements and ballast are disposed on the platform. The wind not being strong, the aëronauts ascended and tried first the effect of their rudder, which is a sail of about 10 metres square. The results were very satisfactory indeed, and the steering of the balloon remarkably quick and easy. The balloon was drifted by the wind from Chalet Meudon to Petit Bicetre, above the Meudon woods. Then the aëronauts, wishing to return home, adjusted the rudder and the experiment succeeded wonderfully; in five minutes the distance, which is about two miles, was run. The balloon landed just before the doorway of its wooden house. This experiment will be tried again in a few days for a longer distance. The system practised by the French officers is a slight modification of the one used by Gaston Tissandier and described in NATURE. The French officers were originally adherents of the helix moving round an axis traversing the balloon, but the result of the experiments published by Tissandier seems to have modified their opinion.

M. F. LHOSTE, Secretary of the Académie d'Aérostation Météorologique de France, who started in a balloon from Boulogne on Thursday last, descended at Romney, fifteen miles from Folkestone, at half-past eight o'clock the same evening. M. Lhoste left Boulogne at seven p.m. He encountered three distinct currents of air, one of which carried him in the direction of the North Sea. The descent was effected without difficulty.

ALREADY a prospectus has been issued of the International Exhibition of Inventions and of Musical Instruments, to be opened in May 1885, in the buildings now standing in the gardens of the Royal Horticultural Society at South Kensington. The Exhibition will have all the advantages of royal patronage and support. Her Majesty the Queen becomes patron, and the Prince of Wales assumes once more the duties of president. The Executive Council, appointed by the royal president, having for chairman Sir Frederick Bramwell, F.R.S., vice-president of the Institute of Civil Engineers, and for vice-chairman the Marquis of Hamilton, is composed of Sir Frederick Abel, C.B., Mr. I. Lowthian Bell, F.R.S., president of the Institution of Mechanical Engineers, Mr. Birkbeck, M.P. (honorary treasurer), Colonel Sir Francis Bolton, Sir Philip Cunliffe-Owen, C.B., C.I.E., Prof. Dewar, F.R.S., Mr. Joseph Dickenson, Sir George Grove, D.C.L., Mr. E. W. Hamilton, Mr. Henry E. Jones, M.Inst.C.E., Mr. W. H. Preece, F.R.S., Sir E. J. Reed, M.P., F.R.S., Prof. Chandler Roberts, F.R.S., Mr. John Robinson, Mr. Warington W. Smyth, F.R.S., Dr. Stainer, and Mr. R. E. Webster, Q.C., with Mr. Edward Cunliffe-Owen as secretary. Mr. J. R. Somers Vine will be the City and official agent. The idea upon which the Exhibition is planned is not to bring together a mere collection of models of inventions, but rather to illustrate the progress which has been made in the practical applications of science during the past twenty years. In order to carry out this intention the Council will, as far as possible, confine the exhibits to processes and appliances, products being admitted only where they are themselves novel or where their introduction is required to make the purpose or advantages of that which is new in any process more interesting and intelligible. It is not proposed to allot space for manufactured goods unaccompanied by any illustrations of the process of manufacture. Generally it may be said that, as far as is practicable, inventions will be shown by models, with, in the case of models of entire machines, actual specimens of the portions improved under the exhibitor's patent, and when the invention relates to parts only the whole machine will not be admitted unless indeed the improvement effected cannot be sufficiently shown without the exhibition of the entire apparatus. The limitations of space which make these restrictions necessary, also compel the Council to decline, unless in exceptional circumstances, to receive objects which have already been shown in the Smoke Abatement Exhibition, 1881, in the Fisheries Exhibition, 1883, or in the present Health and Education Exhibition, and it is thought that the annual shows of the Royal Agricultural and kindred Societies have served so well to exhibit inventions bearing upon agriculture that it will suffice to present a few typical examples (and these models or diagrams) of each class of improvements effected during recent years.

THE U.S. National Academy of Sciences recently received a gift of 8000 dollars from the widow of the late Dr. J. Lawrence Smith. The deed of trust has now been executed, and provides that the interest of the fund shall be used in striking a gold medal of the value of 200 dollars, to be called the "Lawrence Smith Medal," and to be awarded by the Academy, not oftener than once in two years, "to any person in the United States of America, or elsewhere, who shall make an original investigation of meteoric bodies, the results of which shall be made known to the public, such result being, in the opinion of the National Academy of Sciences, of sufficient importance and benefit to science to merit such recognition."

Any sums which may accumulate from the interest of the fund, above what is required for the purposes specified, are to be used "in aid of investigation of meteoric bodies, to be made and carried on by a citizen or citizens of the United States of America."

THERE being a notable difference between the determinations of specific weight of the normal hydrate of sulphuric acid, $H_2SO_4$, which have been made by Marignac in 1853 and 1870, and later on by MM. Schertel, Kohlrausch, Lunge, and Naeff, Prof. Mendeléeff, aided by M. Pavloff, has recently determined it again with all possible accuracy, and communicated the results of his determinations to the Russian Chemical Society (*Journal*, vol. xvi. fasc. 5). The hydrate was crystallised four times, the operations being made in a perfectly dry atmosphere of carbonic acid. Out of 6 kilogrammes, a remainder of only 300 grammes was received. The thus prepared hydrate melted at 10°·1 to 10°·6, and an accurate titration of it gave the following figures: 81·71, 81·52, and 81·58, that is, on the average, 81·6 per cent. of $SO_3$, the theoretic percentage deduced from the chemical formula being 81·64. The specific weight of the hydrate has been determined with great accuracy, and the average result, with all necessary corrections, was 1·83295 at 19°·02. The reduction to 15°, as compared with water at 4°, being made with Marignac's data for dilatation, the final result will be 1·8371, which figure differs only by 0·0001 from that of Marignac, and widely differs from those of Kohlrausch, Lunge, and Naeff.

WHEN submitting the Baku naphtha to fractional distillation, carried on at each 2°, Prof. Mendeléeff had shown that the specific weight of the products of distillation, while rising on the whole together with temperature, decreases however three times, namely, between 55° and 62°, between 80° and 90°, and between 105° and 110°. He shows now, in a recent communication to the Russian Chemical Society (*Journal*, vol. xvi. fasc. 5), that this is not a peculiar feature of the Baku naphtha, but that the same decrease of specific weights is displayed also by American naphtha, if this last be submitted to fractional distillation at each 2°, and that the phenomenon is produced at nearly the same temperatures. The products that boil below 60° were insufficiently represented in Prof. Mendeléeff's samples; but from 60° (where the specific weight, reduced to 17°, like all following, was 0·6642) until 124° (where it was 0·7322), there are two decreases of specific weight. Thus, at 80° it was 0·7347, but only 0·7069 at 92°, that is, the same as at 75°. After that it increases until 104°, where it reaches 0·7543; but it soon decreases for a second time, and at 115° to 117° it reaches 0·7270, that is, the same figure as it had between 85° and 98°. Beyond 117° it continues to rise. Both kinds of naphtha—Caucasian and American—however different their origin, thus display the same phenomena at nearly the same temperatures; the corresponding specific weights, however, are not the same; the portion at 80° has, in the Baku naphtha, a specific weight of 0·7486, and only 0·7347 in the American; and at 100° the respective densities are 0·7607 and 0·7380. The amounts of substance distilled at each temperature are also different. The researches will be continued in Prof. Mendeléeff's laboratory.

WE have been requested to state that at the meeting of the Essex Field Club, referred to in last week's NATURE (p. 343), the natural history and archæological conductor who addressed the Club on the "salting mounds" and other subjects was Mr. Henry Laver, F.L.S., of Colchester.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus* ♂) from India, presented by Mr. T. S. T. Tregellas; a Striped Hyæna (*Hyæna striata*) from North Africa, presented by Sir John H. Drummond Hay, K.C.B., C.M.Z.S.; three Greater Sulphur-crested Cockatoos (*Cacatua galerita*), three Leadbeater's Cockatoos (*Cacatua leadbeateri*), a White-backed Piping Crow (*Gymnorhina leuconota*) from Australia, a Red-sided Eclectus (*Eclectus pectoralis*) from New Guinea, a Blue and Yellow Macaw (*Ara ararauna*) from South America, six Amherst Pheasants (*Thaumalea amherstiæ*) from China, eight Himalayan Monauls (*Lophophorus impeyanus*) from the Himalayas, two Javan Peafowls (*Pavo spicifer* ♂ ♂) from Java, presented by Mr. Charles Clifton, F.Z.S.; a Rough-legged Buzzard (*Archibuteo lagopus*), British, presented by Sir R. Payne Gallwey, Bart.; a Cockateel (*Calopsitta novæ-hollandiæ*), a Rose-Hill Parrakeet (*Platycercus eximius*) from Australia, presented by Mr. J. W. Dixon; a Green Turtle (*Chelone viridis*) from the West Indies, presented by Mr. A. E. Painter, F.Z.S.; a Loggerhead Turtle (*Thalassochelys caouana*) from the Atlantic Ocean, presented by the Surrey Commercial Docks Company; a Leopard Tortoise (*Testudo pardalis*) from South Africa, presented by Mr. William Lane; a Slow-worm (*Anguis fragilis*) from Norfolk, presented by Mr. T. E. Gunn; a Bonnet Monkey (*Macacus sinicus*) from India, a Blue-fronted Amazon (*Chrysotis æstiva*) from Brazil, a Grey Parrot (*Psittacus erithacus*) from West Africa, an Alligator Terrapin (*Chelydra serpentina*) from North America, deposited; two Jardine's Parrots (*Pæocephalus gulielmi*) from West Africa, two —— Conures (*Conurus perlatus*) from the Lower Amazons, an Electric Eel (*Gymnotus electricus*) from British Guiana, purchased; a Mule Deer (*Cariacus macrotis*), born in the Gardens.

## OUR ASTRONOMICAL COLUMN

THE NEXT MINIMUM OF MIRA CETI.—In the ephemeris of variable stars for 1884 in the *Vierteljahrsschrift*, the next minimum of Mira is fixed to 1884 October 24, a date which does not appear to result from Argelander's formula of sines, as it is given in Schönfeld's Catalogue of 1875, viz. :—

$$\text{Epoch Min.} = 1866 \text{ August } 8^{d}\cdot0 + 331^{d}\cdot3363 \cdot E$$
$$+ 10^{d}\cdot48 \sin\left(\frac{360^\circ}{11} \cdot E + 282^\circ\ 45'\right)$$
$$+ 18^{d}\cdot16 \sin\left(\frac{45^\circ}{11} \cdot E + 31^\circ\ 15'\right)$$
$$+ 33^{d}\cdot90 \sin\left(\frac{45^\circ}{22} \cdot E + 70^\circ\ 5'\right)$$
$$+ 65^{d}\cdot31 \sin\left(\frac{15^\circ}{11} \cdot E + 179^\circ\ 48'\right)$$

For the present year E = 20, and hence substituting logarithms the four perturbations become—

$$+ [1\cdot02036] \sin (217^\circ\cdot29) = - 6^{d}\cdot35$$
$$+ [1\cdot25912] \sin (113^\circ\cdot07) = + 16^{d}\cdot71$$
$$+ [1\cdot53020] \sin (110^\circ\cdot99) = + 31^{d}\cdot65$$
$$+ [1\cdot81498] \sin (207^\circ\cdot07) = - 29^{d}\cdot72$$

The Julian date of the initial minimum is 2402822, and we have—

| | |
|---|---|
| | 2402822·0 |
| 331·3363 . E ... ... ... ... | 6626·73 |
| Sum of perturbations ... ... ... | - 12·29 |
| Julian date of next minimum ... ... | 2409461·0 |

Which it will be seen from the *Nautical Almanac* (p. 486) corresponds to 1884 October 11. In 1882 by a very precise determination of the time of minimum, Schmidt found that it occurred on December 16, which is 18 days earlier than the date given by Argelander's formula, and the previous maximum had also been earlier by about 19 days. If this correction still applies the next minimum might be expected to fall about September 23, or a month earlier than the *Vierteljahrsschrift* has it. Still there is the possibility that Prof. Schönfeld may have applied corrections to the formula.

The present year's minimum may be therefore advantageously observed. In that phase Mira descends to about the brightness of the well-known star following it, not far from the parallel, or to about 8·5 m.